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| APPLICATION NO.                  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|----------------------------------|-------------|----------------------|---------------------|------------------|
| 10/525,512                       | 02/24/2005  | Naohiro Soga         | SHM-022             | 7865             |
| 32628                            | 7590        | 10/03/2007           | EXAMINER            |                  |
| KANESAKA BERNER AND PARTNERS LLP |             |                      | LIAO, DIANA J       |                  |
| 1700 DIAGONAL RD                 |             |                      | ART UNIT            | PAPER NUMBER     |
| SUITE 310                        |             |                      | 1709                |                  |
| ALEXANDRIA, VA 22314-2848        |             |                      |                     |                  |
| MAIL DATE                        |             | DELIVERY MODE        |                     |                  |
| 10/03/2007                       |             | PAPER                |                     |                  |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |                 |              |
|------------------------------|-----------------|--------------|
| <b>Office Action Summary</b> | Application No. | Applicant(s) |
|                              | 10/525,512      | SOGA ET AL.  |
| Examiner                     | Art Unit        |              |
| Diana J. Liao                | 1709            |              |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 24 February 2005.
- 2a) This action is **FINAL**.                                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) 6 and 7 is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-5 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:
  1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

|   |  |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                 | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                        | 5) <input type="checkbox"/> Notice of Informal Patent Application                        |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____. | 6) <input type="checkbox"/> Other: _____.  |

## DETAILED ACTION

### *Election/Restrictions*

1. Restriction is required under 35 U.S.C. 121 and 372.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted.

Group I, claim(s) 1-5, drawn to a method for producing a monolithic reactive porous support.

Group II, claim(s) 6 and 7, drawn to a support having a backbone structure or a device comprising such supports.

2. The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

The requirements for a special technical feature are outlined in Annex B of Appendix A1 of the MPEP (Administrative Instructions under the PCT, "Unity of Invention"). Unity exists only when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding claimed technical features. The express "special technical features" is defined as meaning those technical features that define a contribution which each of the inventions, considered as a whole, makes over the prior art." (Rule 13.2).

The question of unity of invention has been reconsidered retroactively by the examiner in view of the search performed; a review of Nakanishi ("Pore Structure Control of Silica Gels Based on Phase Separation" 1997) makes clear that the claimed species is not novel over the prior art. Furthermore, these references appear to demonstrate that the claimed monolithic porous support does not define a contribution which each of the inventions, considered as a whole, makes over the prior art. Accordingly, the prior art of the record supports restriction of the claimed subject matter in to the groups as mentioned immediately above.

The common technical feature of Groups I and II is a monolithic reactive porous support. Nakanishi teaches the production of a monolithic gel with pores that can be used as a support. (page 68) Therefore the common technical feature is not expected to overcome prior art and there is a lack of unity.

3. During a telephone conversation with Mr. Kanesaka on 9/19/07 a provisional election was made to prosecute the invention of Group I, claims 1-5. Affirmation of this election must be made by applicant in replying to this Office action. Claims 6 and 7 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

***Joint Inventors***

4. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

***Status of Application***

5. Claims 1-5 are pending in this application. Claims 6 and 7 have been withdrawn in accordance with an oral election of a restriction requirement.

***Priority***

6. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. JP-2002-244480, filed on 8/26/02.

***Information Disclosure Statement***

7. No Information Disclosure Statement was submitted.

***Claim Objections***

8. Claim 4 is objected to because of the following informalities: Claim 4 specifies that the reactive site "includes a noble catalyst; a metal oxide catalyst, [...] and a combination thereof." Mention of "a combination thereof" implies that what is meant is that the reactive site is selected from the group including said elements, and does not include all of them as the language initially suggests. Appropriate correction to clarify that the reactive site is chosen from a group is required.

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

12. Claims 1 and 4 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Che, et al. (US 4,765,818).

Claim 1 states a method comprising of adding a component containing a reactive site to a sol-gel reaction solution and inducing sol-gel transformation accompanying phase separation to obtain a porous support having a backbone substantially formed of metaloxane bonds and hydrocarbon chains, open pores, and reactivity on the surface thereof. Claim 4 gives a list of suitable "reactive sites".

Che, et al. teaches a process for creating a porous glass monolith. One of the embodiments disclosed includes a composition containing a metal oxide, such as titanium oxide (col 3, lines 28-38), which are considered a reactive site according to claim 4 of the instant application. The process disclosed also utilizes a sol-gel process

which forms a three-dimensional network of metal oxide bonds through a hydrolysis-condensation polymerization reaction of metal alkoxides. (col 1, lines 32-40)

Though Che, et al. does not mention a backbone of metaloxane and hydrocarbon bonds, it is found to be inherent. A review of Nakanishi, "Pore Structure Control of Silica Gels" (1997) shows that alkoxide- based sol-gel reactions with polycondensation leads to the growth of metaloxane oligomers which link together to form a network. (page 69) This is considered to be analogous to a backbone of metaloxane bonds and hydrocarbon chains.

Alternatively, one would find this obvious because a hydrolysis of alkoxides, which is a necessary reaction in this process, very easily leads to polycondensation and metaloxane oligomers. One would want a substantial number of these to be present in the composition in order to form a network on which to put a catalyst, for example. The forming of these bonds also decreases the time of gelation.

Therefore, claims 1 and 4 are not patentable over prior art and are either anticipated and inherent over the cited references, or an obvious step.

13. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Che, et al. in view of Nakanishi, "Pore Structure Control of Silica Gels" (1997).

Che, et al. teaches a pore volume of 10-80% and a pore diameter in the range of 15-2000 angstroms (1.5-200 nm). (col 3, lines 38-42) This reads on the limitation on the instant claim which states a pore volume of 20% or greater. However, Che, et al. only

teaches part of the range of the instant claim, it does not exactly teach open pores of an average diameter of 100nm or greater.

However, it would still be obvious to one of ordinary skill in the art that this process could create a pore size of at least 100nm in view of Nakanishi, "Pore Structure".

Nakanishi, "Pore Structure" discusses many different sol-gel reactions and what they can yield. One of them involves the hydrolysis of an alkoxide, highly polar solvent and phase separation. This analogous process is said to be able to produce pore sizes of between 0.1 and 10  $\mu\text{m}$  (100-10000 nm). (page 77-78)

One would be motivated to create a support with a different pore size depending on the application of the product. If the support is to be used only for small molecules then a smaller pore size would be desirable and produced. If the support is used for reactions involving large macromolecules or has to let a larger volume of liquid flow through it then a larger pore size would be desirable and produced.

Therefore, claim 2 is not patentable over prior art.

14. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Che, et al. in view of Nakanishi (US 5,624,875).

Che, et al. teaches the glass monolith structure being formed into many different forms, including cylinders. However, it offers no other details and limitations of claim 3, which is a column shape, with a covered side surface, in a capillary with a diameter of 1mm or less, or in a groove with a width of 100  $\mu\text{m}$  or less formed in a substrate.

However, it would be obvious to one of ordinary skill in the art to make one of these shapes in view of Nakanishi, et al. (referred to as US '875 from this point on). US '875 teaches a process for making an inorganic porous material. An embodiment of the process includes the hydrolysis of a metalorganic compound in a sol-gel reaction, leading to a three-dimensional interconnected network. (col 3, lines 12-36) One of the uses of the product of this process is to create a rod that will be used in conjunction with an injector or a catheter for blood injection. (col 13, lines 33-35) It is well known in the art that catheter needles are often very small, including sizes from 1mm or less. (Kolin, "An Electromagnetic Catheter Blood Flow Meter..." (1970), page 54)

One would be motivated to make a porous glass cylinder of this size in order to replace packed columns, and the problems and disadvantages associated with them. (US '875, col 2, lines 61-67)

Therefore, claim 3 is unpatentable over prior art.

15. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Che, et al. in view of Rolison, et al. (US 6,492,014).

Che, et al. does not teach a method of producing a monolithic reactive porous support wherein the reactive site is a surface of a fine particle co-existing during a sol-gel reaction.

However, it would still be obvious to one of ordinary skill in the art to put in a reactive site, e.g. a titanium oxide catalyst, in as a fine particle during a sol-gel reaction in view of Rolison, et al. Rolison, et al. teaches the production of a composite aerogel

or xerogel. It teaches a process which allows a particulate being added to a sol-gel reaction at a time where it will not be fully encapsulated by the gel, and before a time when the gel would be too well formed to incorporate another substance without risk of it being washed away. This window is described by shortly before or shortly after the onset of gelation, which in both cases mean that the particle is present during the sol-gel reaction. (col 4, lines 43-46).

One would be motivated to combine these steps because adding the reactive site as a solution, for example, would incorporate a large portion of it into the gel, where it would not be able to react with anything on the surface of the pores. This process allows for controlled deposition of catalysts onto the surface of the gel, without losing a substantial amount from washing or leaching. (col 1, lines 46-48)

Therefore, claim 5 is rejected over prior art.

### ***Conclusion***

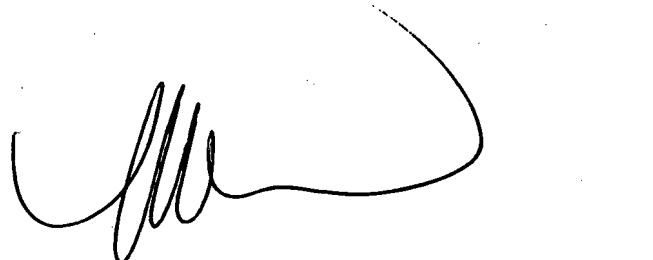
Claims 1-5 have been rejected. Claims 6 and 7, drawn to the non-elected invention, were not examined.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Diana J. Liao whose telephone number is 571-270-3592. The examiner can normally be reached on Monday - Friday 7:30am to 5:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vickie Kim can be reached on 571-272-0579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DJL



VICKIE Y. KIM  
SUPERVISORY PATENT EXAMINER